

Summary Notes from 1 November 2007 Generic Technical Issue Discussion on Removal
of Highly Radioactive Radionuclides/Key Radionuclides to the Maximum Extent
Practical

Attendees: Representatives from Department of Energy-Headquarters (DOE-HQ) and the U.S. Nuclear Regulatory Commission (NRC) met at the DOE offices in Germantown, Maryland on 1 November 2007. Representatives from Department of Energy-Savannah River (DOE-SR) and the South Carolina Department of Health and Environmental Control (SCDHEC) participated in the meeting via a teleconference link.

Discussion: DOE believes that based on the position papers provided prior to the meeting, DOE and NRC staff have many areas of agreement and no significant areas of disagreement with respect to the specific removal of highly radioactive radionuclides/key radionuclides requirements articulated in the respective DOE and NRC requirements. The NRC position paper was based on NUREG-1854 and the DOE position paper was based on DOE Order 435.1 and its associated technical basis and guidance documents. NRC staff noted that there were some changes between the initial draft and final draft of NUREG-1854 in the areas of MEP (Maximum Extent Practicable), and they planned to talk about them during the meeting.

SCDHEC expressed its view that it would be beneficial for DOE to integrate the State requirements into the process, since source reduction is very important to their regulatory approach. DOE indicated that it would be beneficial for SCDHEC to provide input, and that addressing any State concerns early would be beneficial to all parties. NRC staff noted the objective of this meeting was to develop a mutual understanding of NRC staff's expectations with respect to MEP, but does not limit DOE's ability to consider the views or input of other stakeholders.

Topics: The following four specific topical areas were discussed during the meeting:

1. Analyses in support of removal to the MEP
2. Consideration of uncertainty in MEP analyses
3. Technologies to be considered in MEP analyses
4. Termination of removal operations

Summary: The following summarizes the discussion and the principal points of technical understanding identified during the meeting, unless otherwise noted.

Analyses in support of removal to the MEP

- NRC staff noted that Criterion 2 is somewhat more subjective than the other criteria of Section 3116 of the National Defense Authorization Act (NDAA) (e.g., dose-based performance objectives in 10 CFR Part 61, Subpart C) and that evaluations should be quantitative to reduce subjectivity, although in some cases qualitative arguments may be important. The NRC staff stated that it would want sufficient information that covers a wide range of alternatives, including bulk removal as well as selective treatment of highly radioactive radionuclides (HRRs) in a waste stream. It may also include removal of systems, structures, or components of the facility in lieu of treatment or removal of HRRs.
- DOE and NRC staff agreed that consideration should also be given to sequencing of alternatives. Consideration of other similar DOE activities that are not necessarily associated with a waste determination may provide context for removal to MEP in the waste determination.
- DOE and NRC staff agreed that NRC needs a frame of reference for removal to the maximum extent practicable. DOE noted that qualitative benchmarks are of benefit to estimating removal to the maximum extent practicable.
- NRC staff provided an example frame of reference: past releases at Idaho National Laboratory (INL) and the programs that were being used to mitigate the risk from those previous releases.
- NRC staff cautioned that removal metrics may be proportional to the risk (e.g., it is much more cost effective to clean up large sources). Relative metrics (cost per dose reduced) as well as cumulative metrics (total cost) should be considered. Providing comparable information, if available, provides context to the evaluation of MEP.
- DOE cautioned that it is sometimes difficult, for a variety of reasons, to find

truly comparable information.

- DOE and NRC staff discussed whether the same metric would be used regardless of whether the source was stabilized or unstabilized. NRC staff acknowledged that there may be qualitative differences between comparisons made for stabilized versus unstabilized waste. However, if a \$/risk metric is used then the differences in the future exposure rates or risk given the differences in material stability (e.g., grouted waste form versus radioactively contaminated soil) would be implicitly considered through the performance assessment and risk calculations.
- DOE and NRC staff agreed that technologies may evolve rapidly, which may require a periodic reevaluation for systems that have been cleaned but not yet closed as well as for tanks that will be cleaned in the future. NRC staff stated there isn't a hard and fast rule, but that five years seems a reasonable time frame for consideration of new technologies.
- DOE and NRC staff agreed that the important point is that the process will ensure a periodic reassessment of technologies.

Consideration of uncertainty in MEP analyses

- NRC staff noted that uncertainty in MEP analyses can take many different forms. Uncertainty in HRR identification, uncertainty in realized benefits (e.g., technology effectiveness), uncertainty in performance assessment calculations, and uncertainty in costs and schedule for technology development and deployment can all propagate into uncertainty in MEP analyses.
- NRC staff discussed that the uncertainty in highly radioactive radionuclides identification should be considered. The uncertainty can be, but is not limited to: 1) additional radionuclides that may be determined to be highly radioactive for scenarios, or 2) conditions that may not be reflected in a base case performance assessment.
- DOE and NRC staff agreed that waste determinations would need to be based

on what is known with associated assumptions, although some of those assumptions may be uncertain. DOE and NRC staff also agreed that sufficient supporting bases should be provided for waste removal assumptions, so that NRC staff can complete its evaluation of whether Criterion 2 is met.

- NRC staff stated that INL, in 2002, had to do a process similar to this where they had to project waste removal. INL performed conservative estimates of the final inventory to be used in the performance assessment calculations that they later confirmed after waste removal.
- DOE noted that the ability to project waste removal may be more uncertain due to waste characteristics and tank geometry variability.
- NRC staff noted that large uncertainties in the cost-benefit analysis can be managed by making pessimistic assumptions. For example, while DOE should try to develop realistic estimates of costs and benefits, in the face of large uncertainty DOE should try to avoid overestimating cost and underestimating realized benefits, e.g., waste removal efficiencies.
- NRC staff also noted that if the amount of waste removal is very uncertain, then perhaps the timing of a waste determination submittal may need to be reconsidered.
- DOE and NRC staff discussed how the grouping of tanks by tank type and waste may facilitate the MEP demonstration given the differences in tank configurations and waste characteristics that make treatment more or less difficult. NRC staff noted that the MEP demonstration can differ from tank to tank given the risk significance of the individual tank or cumulative dose from the contributions of the entire tank farm.
- NRC staff clarified that they do not evaluate Criterion 2 of the NDAA under their monitoring role; therefore they need sufficient information to come to a conclusion during the waste determination consultation process.
- DOE noted that their plan is for waste determinations to provide an evaluation of currently available technology, as well as an evaluation of the uncertainty

in the projection of new technologies that may become available.

Technologies to be considered in MEP analyses

- NRC staff discussed how technologies should be considered. In addition to geometrical considerations, physical and chemical characteristics of the waste and potential synergies between technologies should be considered. When waste determinations are submitted many years in advance of actual waste removal, new technology development should be considered.
- NRC staff noted that because some of the problems with waste removal are unique to DOE tanks, DOE should consider the development of their own technology as well as an assessment of technology developed by others.
- NRC staff stated that tests to evaluate technology and tests that consider the sequencing of deployment of technology are very important to reducing uncertainty in technology effectiveness.

Termination of removal operations

- NRC staff stated that a key decision in determining if waste has been removed to the maximum extent practicable is deciding when to stop waste removal. The mechanisms for determining when to stop waste removal should be set as early in the process as possible.
- NRC staff stated that decisions to terminate waste removal operations should be well-documented, consider uncertainties, and factor in the impact on entire systems. Reduced efficiency and diminishing returns have been used as the basis for terminating removal operations.
- NRC staff noted that diminishing returns are not a basis unto themselves, but that there is a need to show removing waste at diminishing returns is no longer practical. For example, reconfiguration of mixing pumps may increase removal efficiencies.
- DOE and NRC staff agreed that there should be a mechanism to evaluate how much removal is being achieved during waste removal.

- DOE and NRC staff agreed that characterization techniques should be used to estimate the removal efficiencies achieved for HRRs.
- NRC staff stated that removal goals should be provided for cases where cleaning or treatment operations have not yet been completed. NRC staff also stated that should DOE later find that the level of radionuclide removal is less than the removal goal, it may still be able to develop a justification for why the level of removal achieved demonstrates removal to the maximum extent practical.
- DOE and NRC staff agreed that if removal goals are not met, alternative technologies should be considered. If removal goals are not met due to equipment failure, consideration should be given to repair of the equipment.
- DOE and NRC staff discussed the need for metrics or goals in terminating removal of HRRs.
- DOE expressed concern with establishing quantitative or prescriptive goals, because of the uncertainty of deploying new technology for unique and highly-variable conditions.
- DOE and NRC staff agreed that there should be adequate bases for waste removal to the extent practicable, and it should be documented in a well-structured process.
- NRC staff expressed the view that goals or metrics should be provided in a waste determination in order to better evaluate whether Criterion 2 is satisfied.
- SCDHEC stated that they would expect a best estimate for waste removal to be provided, even if it is uncertain.

Conclusions and Actions:

- DOE noted that they understood the NRC staff expectations for evaluating highly-radioactive radionuclide removal to the maximum extent practical.

- SCDHEC appreciated the opportunity to participate in the meeting and noted that they have previously provided comments related to MEP in the course of review of tank closure documents.